

REMARKS

This application pertains to a novel pressure-sensitive adhesive tape having a cohesive pressure-sensitive adhesive composition comprised of butadiene-acrylate and natural rubber latices.

Claims 1 to 11 and 14 to 16 are pending.

Claims 2, 3, 5, 7, 9, 11, 14 and 15 stand rejected under 35 U.S.C 112, second paragraph, for various reasons indicated more specifically in the office action.

With respect to that branch of the rejection pertaining to the expression "low ammonia or of the high ammonia type" in Claim 2, the Examiner's reconsideration is respectfully requested. An internet search of the "Information Center for Natural Rubber" will show that this web site refers to two types of concentrated latex; one of which is "high-ammonia latex" type and the other of which is "low-ammonia latex" type. These are referred to by this web site as "types". A print-out of the relevant pages from that web site is attached hereto. On "Page 3 of 5", Applicants have underlined the relevant language wherein "high-ammonia latex" and "low ammonia latex" are mentioned. From this it is clear that those skilled in the art use the terms "low-ammonia type" and "high-ammonia type" as terms of art, and that such terms are not at all vague and indefinite to those skilled in the art to which this invention pertains.

Reconsideration is also respectfully requested for that branch of the rejection pertaining to the expression "total solids content" in claims 11 and 15. Those skilled in

the art commonly refer to the ingredients present in various compositions, other than the diluents, as "solids content". There is no doubt that those skilled in the art of latexes will understand what "total solids content" means, and such persons will not find this term to be at all vague or indefinite.

The remaining branches of the rejection, not specifically discussed here, are believed obviated by the amendments made to the claims.

It is believed that rejection of claims 2, 3, 5, 7, 9, 11, 14 and 15 under 35 USC 112, second paragraph has now been overcome and such rejection should be withdrawn.

Applicants gratefully acknowledge the Examiner's suggestion that the substance of original claim 13, now cancelled, be added to the specification. Applicants have followed that suggestion and amended the specification in accordance therewith.

Claims 1-11 and 14-16 stand rejected under 35 U.S.C. 103(a) as obvious over the Abstract of EP 1103587A2 in view of EP 0688843A1.

The Examiner sees EP '587 as apparently disclosing at least Applicants' broad independent claim, except that a resin dispersion is utilized instead of Applicants' claimed blend with a natural rubber. The Examiner sees the second reference as disclosing that "such" adhesives often comprise natural or synthetic rubbers, together with resins, curing agents, etc. From this the Examiner somehow concludes that those

skilled in the art would be motivated by an expectation of improved adhesive performance properties to either incorporate or substitute the butadiene/acrylate dispersion taught by EP '843 into the resin-containing blend with the butadiene/acrylate dispersion taught by EP '587 and thereby arrive at Applicants' adhesive composition.

The Examiner will note, however, that in the '843 reference, the resin is a hydrocarbon resin and is a tackifier (page 2, line 22 and lines 32-35).

The '587 reference also has a hydrocarbon resin, which those skilled in the art would recognize as also being a tackifier.

Since both references already have tackifier resins, and both resins are hydrocarbon resins; no person skilled in the art would ever see the natural rubber of the '843 reference as a substitute for the hydrocarbon resin of the '587 reference. The '843 reference itself does not use a natural rubber as a substitute for a resin, so how could it possibly suggest that such a substitution be made elsewhere?

The object of the '843 reference is to overcome the problems presented by prior art natural or synthetic rubber adhesives which had been applied to tapes as solutions in volatile organic solvents (page 2, lines 7-9). This problem is solved by the '843 reference by applying such natural or synthetic rubber adhesives as aqueous emulsions (page 2, lines 17-24).

There is absolutely nothing to be found anywhere in the '843 reference that

would even remotely suggest that a butadiene-acrylate be added to the rubber emulsions, or that the rubber emulsions be added to butadiene-acrylates. Nothing to be found in this reference would appear to suggest that any other adhesive at all be blended with the adhesive disclosed therein.

Similarly, the '587 reference is concerned with a specific butadiene/methyl methacrylate adhesive formulation, and has nothing that would suggest that there is anything to be gained from the addition of a natural rubber.

The mere fact that those skilled in the art become aware of two different adhesive systems does not suggest that such different adhesive systems be mixed.

The Examiner contends that those skilled in the art would mix these two adhesives with the expectation of "improved adhesive performance properties". Respectfully, there is, however, nothing in either reference to suggest that such a mixture would have "improved" properties. There is therefore absolutely no basis upon which it can be said that those skilled in the art would expect improved properties.

Simply, there is no reason to be found in the art for combining the adhesives of these two different references.

Therefore, Applicants claims cannot possibly be rendered obvious by EP '587 in view of EP '843, and the rejection of claims 1-11 and 14-16 under 35 U.S.C. 103(a) as obvious over said combination or reference should now be withdrawn.

In view of the present amendments and remarks it is believed that claims 1-11 and 14-16 are now in condition for allowance. Reconsideration of said claims by the Examiner is respectfully requested and the allowance thereof is courteously solicited.

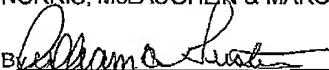
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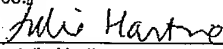
Respectfully submitted,
NORRIS, McLAUGHLIN & MARCUS

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
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Information Center for Natural Rubber

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Julie Harting
Date November 6, 2003

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The history of natural rubber has been the subject of many publications because over the last years the centennial of the introduction of the *Hevea Brasillensis* in the Far East has been celebrated.

The first young Hevea seedlings were planted in Sri Lanka, Malaysia and Indonesia as from 1876 and the French started growing this tree in Vietnam in 1897. Now the area under rubber trees, mainly in the Far East, but also in Africa and Middle and South America, covers 8-9 million hectares, with an annual production in 1998 of some 6,600 x 10³ tonnes.

Starting with unselected seedlings, subsequent generative selection resulted in improved clonal planting material. Combined with tapping systems adapted to the generative rubber production capacity of the trees yields increased from less than 500 kg to over 2,500 kg/Ha/year. Thanks to increased use of latex flow stimulating agents even higher yields can be obtained under favourable conditions.

Production of concentrated latex started in the thirties, first bulk deliveries went to the United Kingdom in 1931. Table I gives the development of total NR production and of concentrated latex production and consumption from 1926 to 1998.

	Total NR Production	NR Latex	% Latex
1926	633,000	3,300	-
1933	865,000	15,800	1.8
1940	1,417,000	44,750	9.1
1960	2,145,000	169,750	8.0
1970	2,990,000	256,750	8.6
1980	3,760,000	268,000	7.1
1985	4,350,000	347,000	8.0
1990	5,270,000	590,000	11.2
1995	5,980,000	710,000	11.8
1998	6,600,000	810,000	12.2

Table I Production/Consumption of Total Natural Rubber and NR Latex Concentrate

Up to 1985 NR latex concentrate production was between 7 and 9% of total NR produced. This share rose to 11.2% between 1986 and 1990 and increased to 12.2% in 1998 (810.000 tons). The sudden increase after 1986 coincides with increased use of protective articles after the outbreak of the AIDS epidemic.

Table II gives an approximate of the percentage consumption of NRL concentrate in different sectors of usage.

Dipped Goods	52%	gloves, catheters, etc.
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	3%	balloons, condoms
Latex Foam	8%	
Latex Thread	10%	
Adhesives and Binders	10%	various types
Binders	10%	binders e.g. for artificial leather and leather board
Carpet backing, Textile	5%	also for embossed foam backings
Miscellaneous	3%	

Table II Approximate Usage of NR Latex Concentrate (1996 in %)

Production

The source material for NRL concentrate is freshly tapped field latex. After opening the tapping cut the latex flows out of a system of intercommunicating latex vessels in the soft bark. These vessels are arranged in rings with connections between vessels within a ring but seldom between rings.

Latex is in fact of cytoplasm structure and contains i.e. ribosomes but seldom nuclei. Apart from rubber particles very freshly tapped latex also contains so-called luteoid particles which can be separated by centrifuging at low speed and more or less yellow/ orange coloured Frey-Wyssling particles containing a.o. carotinoids.

The composition of the fresh latex is rather complex due to its origin and the relative proportions of certain constituents (e.g. proteins and minerals) can show important variations depending on many factors (clone, season, tapping system). The same is true for its rubber content, which is normally between 34 and 38%.

A typical composition is as follows:

Typical Fresh Latex Composition

Total Solids Content	41.5%
Dry Rubber Content	36.0%
Amino Acids and N-Bases	0.30%
Neutral lipids	1.0%
Proteins	1.60%
Phospholipids	0.60%
Inositols-Carbohydrates	1.5%
Salts (mainly K,P and Mg)	0.50%
Water	58.5%

As soon as possible the latex is temporarily preserved with ammonia (the quantity depending on the delay between processing into concentrate and harvesting the crop) in order to prevent bacterial contamination or at least to limit its effects.

The cytoplasm structure of the latex, already altered by physiologic changes due to tapping (trunk contraction and absorption of water from the surrounding cells) is now destroyed and remnants are

subsequently eliminated by sedimentation and by centrifugation, together with magnesium ammonium phosphate formed in this ammoniac medium.
Details on the composition and characteristics of latices from clones recommended for planting in Malaysia are given in reference 1.¹

Concentrated latex

The commercial product is nowadays mainly prepared by centrifugation; and there are only two types made on a large scale:

HA (high-ammonia) latex, preserved with 0.7% ammonia

LA-TZ (low ammonia) latex, preserved with 0.2% ammonia + 0.025% TMTD/ZnO + 0.04 - 0.05% lauric acid as ammonium laurate.

In addition are available:

PV latex. The Pre-Vulcanized latex is in wide spread use. Natural latex can be readily vulcanised in the liquid state and the product retains most of the good-processing characteristics of raw-latex concentrate.

Creamed and evaporated Latex. These latices of 65 and 66% DRC respectively are produced each by only one producer in Malaysia.

Zero Protein Cream Latex (new). Contains virtually no extracted proteins.

Typical properties and composition of HA Latex and LA-TZ Latex

The data in Table III has been published in two papers by A.D.T. Gorton and T.D. Pendle entitled 'Processability of LA-TZ (resp. High Ammonia) latices in Relation to their Properties. 2a, 2b

In this study 20 samples obtained from European dealers of both types of latex, believed to be representative for bulk material at that time (1983), were tested on:

- parameters as prescribed by the ISO specifications
- viscosity Brookfield LVT at 25°C at 6 and 60 r.p.m.
- stability to ZnO: assessed using the German ZST test and viscosity increase test (ZAAV), in which the ZnO is already present in solution as a $Zn(NH_3)_n^{2+}$ complex.
- and analysed for nitrogen, total and inorganic Phosphorus, Potassium and Magnesium content.

In addition conductimetric titrationis were carried out with potassium hydroxide and ammoniated zinc acetate (ZAAV) on latex and serum in order to evaluate the significance of such tests for assessing the concentration of adsorbed anions and ammonium soap on the rubber particles surface.

Item	Latex HA	Total solids film	Latex LA-TZ	Total solids film
Rubber	59.67	97.61	59.61	97.32
Protein, etc.	1.06	1.73	1.03	1.68
Soaps	0.23	0.38	0.38	0.62
Salts	0.40	0.28	0.38	0.38
Ammonia	0.68	-	0.21	-
Water	37.96	-	38.45	-
TCS (%)	61.31	-	61.25	-
DRC (%)	59.67	-	59.61	-
Non rubber solids (%)	1.64	-	1.64	-
PH	10.65	-	10.08	-

Alkalinity (% aqueous phase)	1.76	-	0.54	-
MST (s)	1168	-	1131	-
VFA No.	0.07	-	0.05	-
KOH No.	0.63	-	0.58	-

Table III Composition and Properties of Typical Commercial HA and LA-TZ Latexes (% by weight)

Chemical Stability

The above study confirmed that for commercial lots there is some direct relationship between the ZST and the mechanical stability test values for LA-TZ latexes and that at least for these samples of widely varied origins the ZST gives no more information than the MST test. For the great variability in ZAAV viscosity no explanation in terms of composition and specification parameters could be found. The assessment of the surface isopropyl alcohol was supposed to be too imprecise to permit conclusions on the reasons for the instability found sometimes with the ZAAV viscosity test. For the HA-Latexes the stability when judged by the ZST values was lower than for LA-Latexes, but they appear much more stable in the Zinc Acetate viscosity test. This is essentially due to the higher pH of the HA latex as a similar effect is noted when the ammonia content of a LA-TZ latex is increased.

Mechanical Stability

The mechanical stability (MST) is the only property of the standard specifications referring to a fundamental characteristic of colloidal systems-its stability. The rubber particles in the latex are covered with a protective bilayer of phospholipids and proteins. In the ammoniac medium the lipids hydrolyse under formation of higher fatty acids soaps (HFA). HFA formation during the first 6-8 weeks after ammoniation parallels development of MST, increasing from 100 seconds up to 800 seconds and over. This process has been studied in some detail for HA latexes; in LA Latexes like LA-TZ the MST has to be boosted by addition of soap, normally NH_4 -laurate, at about 0.05% on the latex.

In a few clonal latexes a.o. from the Clone PR 107, preserved with 0.7% ammonia only this MST increase with time is not observed and there are more clones which require the addition of a small amount of NH_4 -laurate (0.02%) in order to obtain in the HA quality the required MST value of the least 650 seconds. The reason for this abnormal behaviour is obscure.⁴

Also obscure are the reasons for the significant increases in MST after a short heating at 60°C and this phenomenon is at least partially reversible. It is suggested that this MST increase may be due to a change in the structural configuration of the adsorbed protein.

References

- ¹ Esah Yip: *Clonal characteristics of latex and rubber properties*. J.Nat.Rubb.Res. 5 (1) 52 (1990)
- ^{2a} *Processability of LATZ in relation to their properties*. Int. Rubb. Conf. Kuala Lumpur 1985
- ^{2b} *Properties and processability of HA latexes in relation to their properties*. J.Nat.Rubb.Res. 1 (2) 122 (1986)
- ³ Chen Seong Fong and Ng Chiew Sum: *The effect of the Natural Higher Fatty acid soaps in NR-latex on the MST of the latex*. Rubber Chemistry and Technology 57 243 (1984)
- ⁴ *Variability of Hevea Latex*. Arch.Rubber Culture. 32 (1) (1955).

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